An Overview of ASC Efforts in Parallel First-Order Sn Methods

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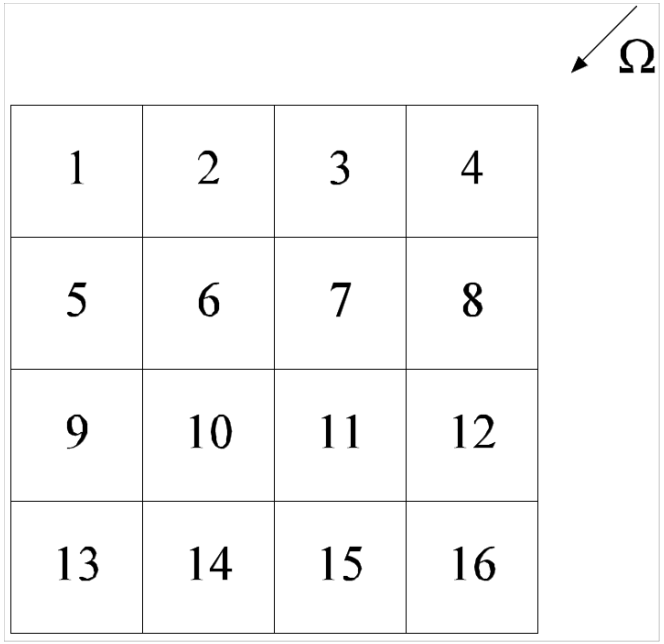
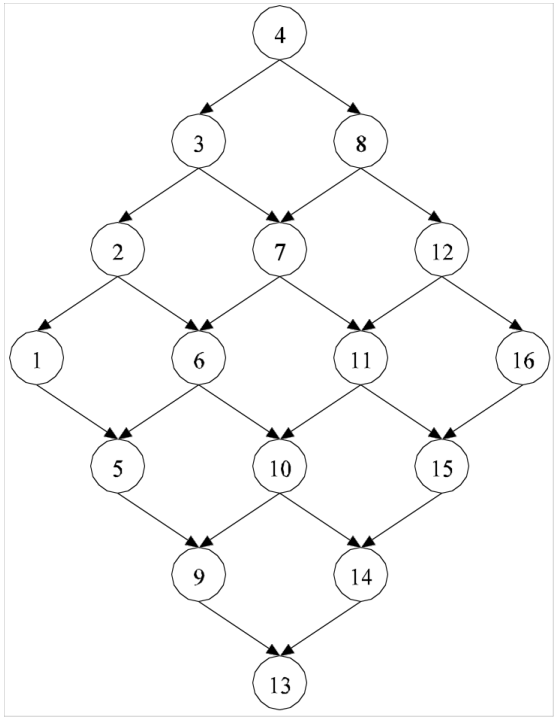
Sweeps of Structured Meshes





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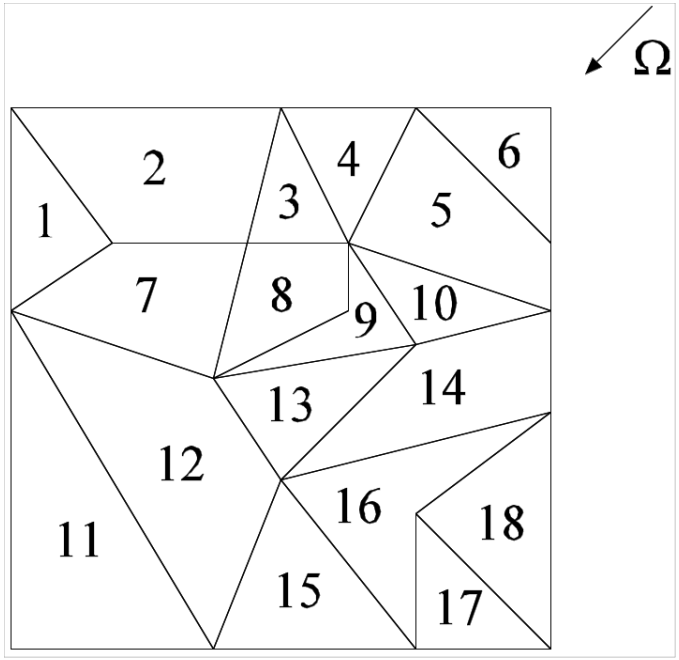
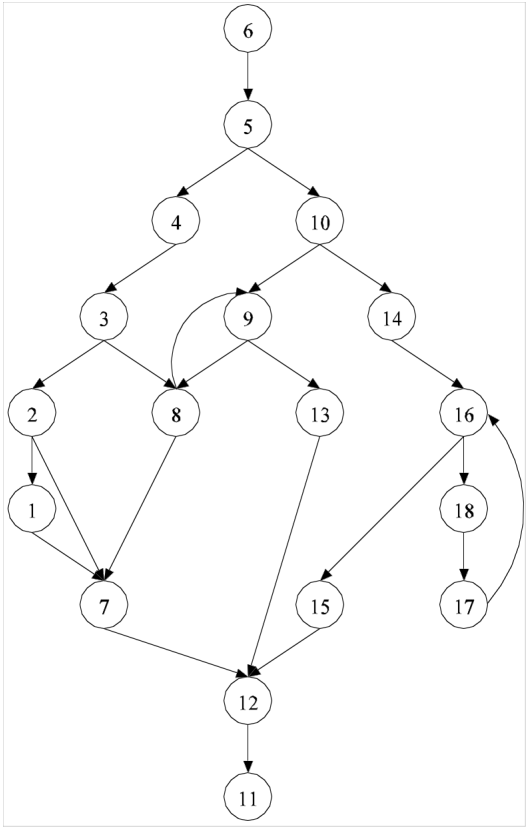
Sweeps of Unstructured Meshes





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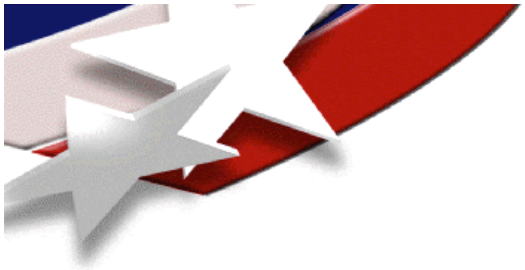


Parallel Sweeps of Structured Meshes

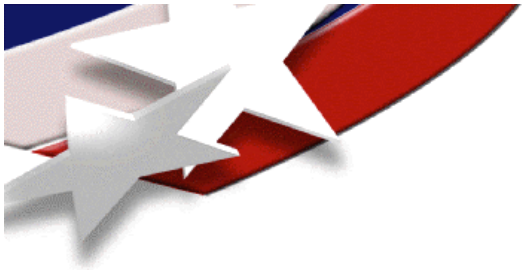
Spatial decomposition

- Avoid large total communication costs
- Distribute tasks across sweep graph levels

Sweep ordering

- Avoid excessive violations of sweep graph
- Avoid message sizes that are too small or too large

KBA algorithm effective for structured meshes



Parallel Sweeps of Unstructured Meshes

- Mesh decomposition
- DCGs → DAGs
- Sweep ordering
- Communication pattern
- Violations of sweep graph
- Iterative preconditioners

Texas A&M University Research

Academic Strategic Alliances Program

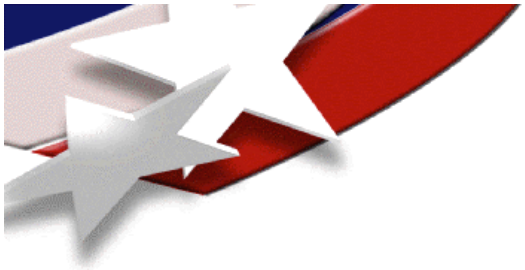
Results

- Parallel sweeping problem = scheduling problem, with constraints
- Groupsets, anglesets, cellsets
- KBA analysis and improvements
- TSA development
- STAPL development

Lawrence Livermore Research

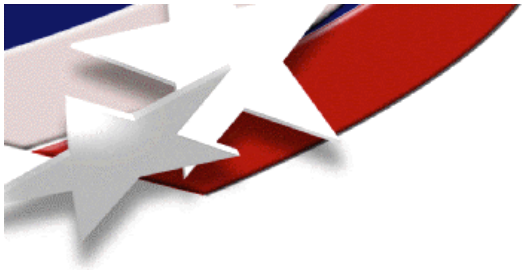
TETON

- Block-Jacobi sweeps
- Threading over angle
- Energy batching (groupsets)
- TSA



Los Alamos Research

- PARTISN
  - KBA with structured, AMR meshes
  - DSA, TSA
- Tycho
  - Tetrahedral meshes
  - Sweep ordering algorithms
- Performance modeling
- Capsaicin



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- Mesh partitioning
- Parallel sweep cycle analysis
- Ceptre development